



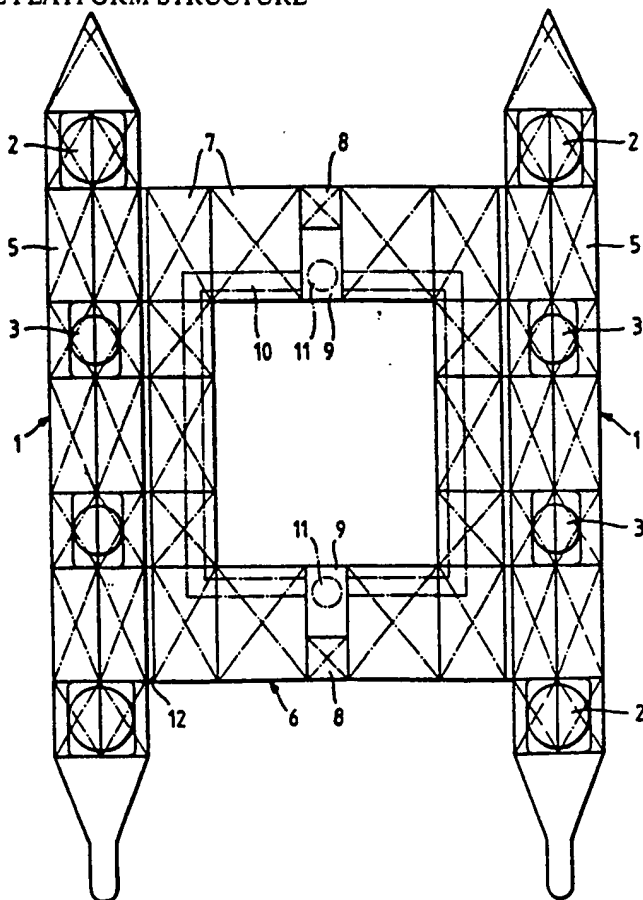
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁴ : B63B 35/44	A1	(11) International Publication Number: WO 87/ 00138 (43) International Publication Date: 15 January 1987 (15.01.87)
(21) International Application Number: PCT/NO86/00046 (22) International Filing Date: 1 July 1986 (01.07.86) (31) Priority Application Number: 852686 (32) Priority Date: 3 July 1985 (03.07.85) (33) Priority Country: NO (71) Applicant (for all designated States except US): AKER ENGINEERING A/S [NO/NO]; Tjuvholmen, N-0250 Oslo 2 (NO). (72) Inventor; and (75) Inventor/Applicant (for US only): SANDNÆS, Per, Chr. [NO/NO]; Torjusbakken 19, N-0378 Oslo 3 (NO). (74) Agent: A/S OSLO PATENTKONTOR DR. ING. K. O. BERG; Holtegaten 20, N-0259 Oslo 2 (NO).		(81) Designated States: FI, GB, JP, KR, SE, US. Published <i>With international search report.</i> <i>In English translation (filed in Norwegian).</i>

(54) Title: ARRANGEMENT IN A SEMISUBMERSIBLE PLATFORM STRUCTURE

(57) Abstract

A semisubmersible drilling platform has two longitudinal pontoons (1) from which columns (2, 3) extend upwards and support a deck (4). In order to provide a cheap production platform which may permit exploitation of marginal oil fields and concurrently provide alternative employment for such a drilling platform, it is provided with a supplementary unit (6) comprising storage tanks (7) for crude oil. The supplementary unit has an internal access tunnel (10) communicating with the deck (4) through an access shaft (11). The supplementary unit is built as an independent unit having sloptanks (8) and pump rooms (9). The supplementary unit (6) is attached to the pontoons (1) where these have bulkheads, by means of brackets (12). These brackets may simply be burnt through if the platform structure again is to be converted back to a drilling platform, or one may remove only the transverse portions of the supplementary unit and let the longitudinal portions remain in order to give the drilling platform increased carrying capacity.



the supplementary unit.

According to an advantageous feature of the invention, the supplementary unit is installed between the pontoons of the platform structure. Here the supplementary unit will be relatively protected and may additionally form a structural element increasing the strength and possibly also the carrying capacity of the platform structure.

The supplementary unit may advantageously be in the form of an annular body of quadrangular shape. The supplementary unit may thus be given an optimal size, while the opening in the middle will give room for risers etc. and prevent the hydrodynamic wave forces acting on the supplementary unit from becoming too high. By any later converting back to drilling platform it will be possible to remove only the transverse portions of the annular body. The remaining longitudinal portions of the body may serve to give the platform increased carrying capacity and payload.

According to the invention at least one access shaft is arranged between the supplementary unit and the deck of the platform structure. The location and dimensioning of the access shaft is preferably performed for it to provide stiffening of the supplementary unit and concurrently provide an advantageous increase of the waterline cross-section of the structure. The supplementary unit may also be provided with an access tunnel, which may be arranged interiorly or exteriorly of the supplementary unit, said access tunnel being connected to the access shaft or shafts.

As one of several alternatives to the annular supplementary unit, two transverse supplementary units may be arranged, one at the front and one at the rear. These may be identical and be installed symmetrically. Furthermore, it may be advantageous to install the supplementary unit or units so that it or they entirely lie above the lowest waterline of the platform structure. Thereby the supplementary units may be installed without docking the

platform structure, but just by floating the units in place while the platform structure is in semisubmerged condition, whereupon it is raised and the supplementary unit welded in place. With the supplementary units in this position they will also quite effectively serve to protect the drill string and riser against drifting objects, for instance drifting ice, when the platform is in use.

However, it will also be possible to install the supplementary units on the bottom side of the pontoons. In this case, the supplementary units are ballasted so that they rest at a suitable place on the bottom, or are suspended from floats, whereupon the platform structure is floated in place above them. Then the supplementary units are unballasted so that they come to raise the platform structure completely out of the water, whereupon the supplementary units and the platform structure may be connected to each other, also in this case without docking being necessary.

In accordance with the invention it is also suggested to make the supplementary units independent in the sense that they comprise necessary pump rooms, slop-tanks etc. in addition to the storage tanks, with equipment and piping finished in advance. In this way the necessary time for joining the units to the platform structure is held to a minimum.

For the better understanding of the invention it shall be described more closely with reference to the exemplifying embodiments shown in the appended drawings.

Fig. 1 shows a vertical cross-section through a platform structure according to the invention.

Fig. 2 shows a plan view of the platform in Fig. 1, seen generally along the line II - II in Fig. 1.

Fig. 3 shows a plan view of an alternative embodiment of the platform structure according to the invention.

Fig. 4 shows a further alternative embodiment of the platform structure.

The platform structure shown in Figs. 1 and 2 com-

prises two longitudinal pontoons 1 and columns 2 and 3 extending upwards from the pontoons and supporting a deck structure 4. The pontoons contain a number of tanks 5 for e.g. ballast and fuel oil.

5 Between the pontoons 1 a supplementary unit 6 is arranged, the unit having the general form of an annular body of quadrangular shape. The supplementary unit comprises a number of storage tanks 7 for e.g. crude oil, and in addition has sloptanks 8 and pump rooms 9. An
10 access tunnel 10 is arranged inside the supplementary unit, said access tunnel communicating with two access shafts 11 leading to the deck 4.

 The supplementary unit is connected to the pontoons 1 by means of brackets 12, which are welded in places
15 where the supplementary unit and the pontoons have internal bulkheads. If the platform structure later is to be converted back to a pure drilling platform, the brackets 12 may be burned through so that the entire supplementary unit can be removed, or the longitudinal
20 portions of the supplementary unit may remain in place, while the transverse portions at the front and rear are removed. The remaining portions of the supplementary unit will thus entail an upgrading of the load carrying capacity of the platform.

25 Fig. 3 shows an alternative embodiment where two supplementary units 13 and 14 are arranged between the pontoons 1. These units are identical and are arranged symmetrically, one at the front and the other at the rear of the platform structure. The supplementary units also
30 in this case are subdivided into storage tanks 15 and are connected to the deck by means of an access shaft 16.

 In the exemplifying embodiment in Fig. 4, supplementary units 17 and 18 are arranged alongside the
35 pontoons 1, which have had their bow portion modified, where pump room 19, sloptank 20 and access shaft 21 are placed.

 It will be understood that the invention is not restricted to the exemplifying embodiments shown, but that

it may be modified and varied in a number of ways within the scope and spirit of the invention. Thus, the transverse portions of the supplementary unit may be placed closer to the center of the platform in order to give less pitching motion. Furthermore, it may be advantageous to arrange additional columns, e.g. between the supplementary unit and the deck, in order to provide a larger moment of inertia and waterline area, while the heave response of the platform is maintained near the original value. Such further columns may also be utilized as storage tanks.

15

20

25

30

35

C l a i m s

1. Arrangement in a semisubmersible platform structure having at least two longitudinal pontoons (1), from which
5 c h a r a c t e r i z e d in that it further comprises at least one supplementary unit (6, 13, 14, 17, 18) comprising storage tanks (7, 15) for crude oil or the like.
- 10 2. Arrangement according to claim 1, c h a r a c t e r i z e d in that the supplementary unit (6, 13, 14) is installed between said pontoons (1).
- 15 3. Arrangement according to claim 1 or 2, c h a r a c t e r i z e d in that at least one access shaft (11, 16, 21) is arranged between the supplementary unit (6, 13, 14, 17) and said deck (4).
- 20 4. Arrangement according to claim 3, c h a r a c t e r i z e d in that an access tunnel (10) is arranged interior or exterior of the supplementary unit, said access tunnel (10) communicating with said at least one access shaft (11).
- 25 5. Arrangement according to a preceding claim, c h a r a c t e r i z e d in that the supplementary unit (6) is formed generally as an annular body of quadrangular shape.
- 30 6. Arrangement according to one of the claims 1 - 4, c h a r a c t e r i z e d in that two supplementary units (13, 14) are provided, one (13) at the front and one (14) at the rear of the platform structure.
- 35 7. Arrangement according to a preceding claim, c h a r a c t e r i z e d in that at least one supplementary unit (6, 13, 14) is installed so that it at least partially lies above the lowest waterline of the platform

structure.

8. Arrangement according to claim 7,
c h a r a c t e r i z e d in that said at least one
5 supplementary unit (6, 13, 14) is installed resting on the
pontoon (1).

9. Arrangement according to one of the claims 1 - 6,
c h a r a c t e r i z e d in that at least one of the
10 supplementary units (13, 14) is installed on the bottom
side of the pontoon (1).

10. Arrangement according to a preceding claim,
c h a r a c t e r i z e d in that the supplementary
15 unit (6, 13, 14, 17, 18) is manufactured as an independent
unit comprising pump room (9, 19) and sloptank (8, 20).

20

25

30

35

INTERNATIONAL SEARCH REPORT

International Application No. PCT/NO86/00046

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC ⁴ <div style="text-align: center; font-size: 1.2em; margin-top: 10px;">B 63 B 35/44</div>																	
II. FIELDS SEARCHED <div style="text-align: center; font-size: 0.8em; margin-top: 10px;">Minimum Documentation Searched ⁷</div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width: 30%; text-align: left; font-size: 0.8em;">Classification System</th> <th style="text-align: left; font-size: 0.8em;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 4</td> <td style="padding: 5px;">B 63 B 35/44</td> </tr> <tr> <td style="padding: 5px;">US C1</td> <td style="padding: 5px;">114:264, 265</td> </tr> </table> <div style="text-align: center; font-size: 0.8em; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div> <div style="margin-top: 10px;">SE, NO, DK, FI classes as above</div>			Classification System	Classification Symbols	IPC 4	B 63 B 35/44	US C1	114:264, 265									
Classification System	Classification Symbols																
IPC 4	B 63 B 35/44																
US C1	114:264, 265																
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; font-size: 0.8em;">Category ¹⁰</th> <th style="font-size: 0.8em;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 15%; font-size: 0.8em;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">P</td> <td style="padding: 5px;">SE, B, 442 619 (GÖTAVERKEN ARENDAL AB) 20 January 1986</td> <td style="vertical-align: top; padding: 5px;">1, 2, 5,6</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">SE, B, 431 316 (GÖTAVERKEN ARENDAL AB) 30 January 1984</td> <td style="vertical-align: top; padding: 5px;">1-10</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3 490 406 (PETER J F O'REILLY) 20 January 1970</td> <td style="vertical-align: top; padding: 5px;">1-10</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 1 604 357 (BRITISH PETROLEUM COMPANY LIMITED) 9 December 1981</td> <td style="vertical-align: top; padding: 5px;">4, 5</td> </tr> </table>			Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	P	SE, B, 442 619 (GÖTAVERKEN ARENDAL AB) 20 January 1986	1, 2, 5,6	A	SE, B, 431 316 (GÖTAVERKEN ARENDAL AB) 30 January 1984	1-10	A	US, A, 3 490 406 (PETER J F O'REILLY) 20 January 1970	1-10	A	GB, A, 1 604 357 (BRITISH PETROLEUM COMPANY LIMITED) 9 December 1981	4, 5
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³															
P	SE, B, 442 619 (GÖTAVERKEN ARENDAL AB) 20 January 1986	1, 2, 5,6															
A	SE, B, 431 316 (GÖTAVERKEN ARENDAL AB) 30 January 1984	1-10															
A	US, A, 3 490 406 (PETER J F O'REILLY) 20 January 1970	1-10															
A	GB, A, 1 604 357 (BRITISH PETROLEUM COMPANY LIMITED) 9 December 1981	4, 5															
<div style="font-size: 0.8em;"> <p>¹⁰ Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div>																	
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">1986-09-24</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">1986 -10- 0 6</div> </td> </tr> <tr> <td style="padding: 5px;"> International Searching Authority <div style="text-align: center; font-weight: bold;">Swedish Patent Office</div> </td> <td style="padding: 5px;"> Signature of Authorized Officer <div style="text-align: center;">Ake Olofsson </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">1986-09-24</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">1986 -10- 0 6</div>	International Searching Authority <div style="text-align: center; font-weight: bold;">Swedish Patent Office</div>	Signature of Authorized Officer <div style="text-align: center;">Ake Olofsson </div>											
Date of the Actual Completion of the International Search <div style="text-align: center; font-weight: bold;">1986-09-24</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-weight: bold;">1986 -10- 0 6</div>																
International Searching Authority <div style="text-align: center; font-weight: bold;">Swedish Patent Office</div>	Signature of Authorized Officer <div style="text-align: center;">Ake Olofsson </div>																